IFPS Era Verification: ISST Requirements, Endorsements, and Proposals

Brief to OS&T

March 5, 2004

Brief History of NWS Forecast Verification

- Formation of National Verification Committee (1982)
  - "Has fallen into disuse past decade" – From National Verification Plan (12/31/03)
- MDL system
  - AWIPS Era Verification
  - Web
- Lack of adequate, real-time forecast feedback in WFOs
  - Field developed software to address need
    - SOOVER, Aviation Verify

ISST Verification Efforts to Date

- Endorse verification as critical part of IFPS
  - Within original list of 8 proposals in IFPS SOO/DOH Whitepaper
- 2-pager sent to SOOs, SSDs, and MSDs

  (4 August 2003)
  - Re-emphasizing verification priority and listing concerns with ORD verification
- Provided IWT input on NDFD Verification Plan
  - Asked to prioritize 21 tasks in 31 Dec ’03 version of plan

Base Verification System Requirements

- Verification should be key component of IFPS
  - Training is critical to program success
- Must have gridded and point verification
  - Must match minimum, agreed-upon grid spacing for local digital forecast database
  - Point system must include all available observations
  - Object verification also desirable
  - Improvements over persistence and climatology
    - Requires gridded climatology
- Flexible, real-time display in AWIPS/D2D and GFE
  - Could stratify by region, zone, forecast period, office, etc.
  - System consistency across all levels of agency
- Provide customers and partners with ability to calculate various measures of forecast accuracy and quality

ISST Review of NWS IWT Verification Plan

- Provides foundation for building viable IFPS verification system
- Divided 21 tasks into five categories:
  - Enhancing the existing MDL system
  - Develop a new system with a relational database with GIS capabilities
  - Local office real-time access and display
  - Training and education
  - Analysis of Record

Key ISST Endorsements

- Establishing verification program leadership
  - Necessary for building and maintaining system
- Need for gridded and point verification
  - Gridded verification needs immediate Analysis of Record development proposed in plan!
    - EMC involvement
    - Prototype through use of existing systems (e.g., ADAS)
    - Establishing gridded climatologies
  - Verifying model forecasts
    - Should be down to the “Smart Init” level for each element
  - Point verification should use all available observations
    - Includes automated quality control procedures
    - Will need system that can be tailored by user
- Verification training and education is critical

Notable Plan Deficiencies

- Immediate need for real-time, forecaster feedback in AWIPS/D2D and especially the GFE
  - Plan proposes short and long term statistics through web access and display only
- RDBMS solution is web-based
  - Any RDBMS must run in parallel to GFE system
- No specific mention of OCONUS verification
  - Does not address lack of existing high-resolution OCONUS analysis system

Getting It Off the Ground

- Propose enhancement of current MDL system…
  - Easily accessible forecaster feedback in real-time
  - Ingest and display of verification data within AWIPS/D2D and GFE
    - Should include enhancement of existing DFC functionality
  - Expand upon current set of verifying observations
  - Must agree on a minimum, matching NDFD-GFE grid spacing
    - Allows transportability of NDFD gridded verification to GFEs
  - Will require additional hardware resources

Getting It Off the Ground (cont.)

- …in parallel to promoting and supporting R&D on more robust verification system
  - Including use of relational database and GIS methods
    - Build from lessons learned from, and methods of, FSL's Real-Time Verification System (RTVS)
  - Should complement, not replace, AWIPS/D2D and GFE system

Other Efforts needed to Get it Off The Ground

- Need to establish accuracy and success criteria
  - Impact on experimental to official transitions
- Need to determine method to assess quality, strength, and weakness of gridded forecast products and supporting model guidance
  - Measures- and distribution-oriented
    - Also explore adding other verification measures to determine forecast quality (e.g., spatial data mining or object-oriented approach)
  - Must begin providing forecasters with error grids

Proposed Immediate Tasks

- Gather and document operational requirements to guide system development
  - Should kickoff with ISST verification paper
- Plow ahead with formation and work of NDFD Verification Action Team
  - Guided by operational requirements document
  - Should determine initial resource allocation to quickly get system off the ground
  - Will oversee system development and implementation
- Establish baseline standards/criteria for forecast accuracy

Proposed Immediate Tasks (cont.)

- Formulate Prototype Verification Project
  - WFO subset used for system testing and feedback
  - Enhance current MDL system to display and interrogate, in near real-time, verification data and grids within AWIPS/D2D and GFE
    - Measures-oriented with distribution-oriented development
  - Blend into DFC framework
  - Prototype gridded verification with existing high-resolution analysis systems (e.g., ADAS)
    - Explore development of a national ADAS
    - Investigate use of FSL's Meteorological Assimilation Data Ingest System (MADIS)
  - Add more observations to point verification system

Critical Development Efforts

- Hold USWRP-sponsored Analysis of Record Workshop
  - Must begin moving on Analysis of Record work!
  - Initial contacts have been made
  - Must address OCONUS requirement for high-resolution analysis
- Promote internal and external R&D on robust verification system and methods
  - E.g., CSTAR, COMET RFPs

System Development Guidelines

- Advocate collaboration and coordination of current development and program efforts
  - Limited resources require elimination of redundant efforts
- Leverage resources among universities and research and development labs to maximize productivity and implementation time line
  - Immediate need for real-time verification system in field requires careful collaboration among groups
  - Program leadership critical to success